

Plume Velocimetry Diagnostic for Large Rocket Engines, Phase I

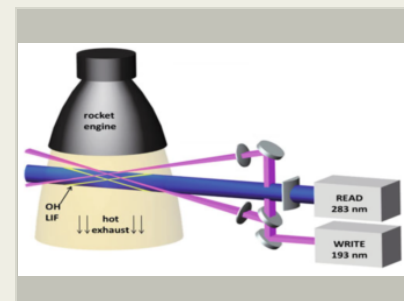
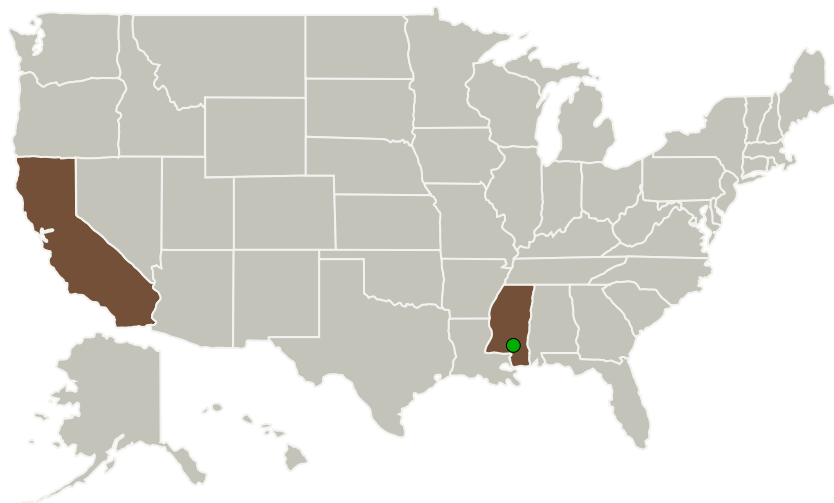
Completed Technology Project (2016 - 2016)



Project Introduction

An instrument is proposed for non-intrusive measurements of velocity in the plume of a large rocket engine of the type used in the first or second stage of a launch vehicle. The method is laser-based and has the potential for standoff distances in the tens of meters, so optical components can be a safe distance from the hot gases. The diagnostic does not require flow seeding, works over the full temperature range, and covers the full range of velocities of a typical rocket engine. The method, hydroxyl tagging velocimetry (HTV), has already been successfully demonstrated on a small rocket engine. The proposed effort will adapt this technique to large engines by minimizing the effects of beam attenuation and beam steering due to turbulence and developing a robust beam delivery and detection system. Because OH molecules survive at high temperatures for appreciable lifetimes, it is anticipated that the HTV technique will work in even the highest temperature rocket plumes. The proposed diagnostic will provide measurements not obtainable by current methods and will enable experimental data that can be used for validating computer models of rocket engine performance.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
MetroLaser, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Laguna Hills, California
● Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi

Primary U.S. Work Locations

California	Mississippi
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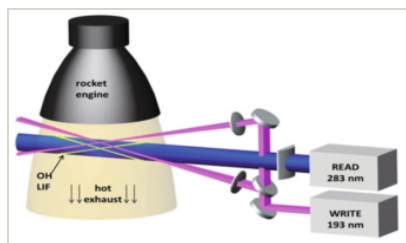
Project Transitions

**June 2016:** Project Start**December 2016:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139600>)

Images



Briefing Chart Image

Plume Velocimetry Diagnostic for Large Rocket Engines, Phase I
(<https://techport.nasa.gov/image/132016>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

MetroLaser, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

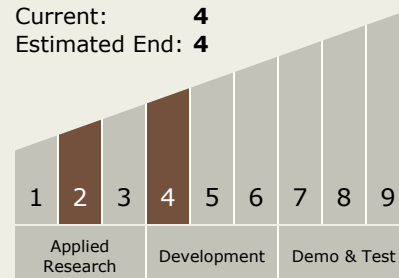
Tom Jenkins

Technology Maturity (TRL)

Start: 2

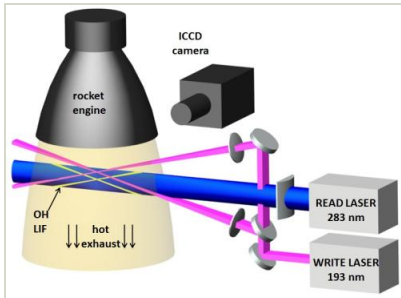
Current: 4

Estimated End: 4



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Final Summary Chart Image

Plume Velocimetry Diagnostic for
Large Rocket Engines, Phase I

Project Image

(<https://techport.nasa.gov/image/132985>)

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
 - └ TX13.1 Infrastructure Optimization
 - └ TX13.1.5 Ground and Surface Logistics

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System